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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/995,031

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Ricky Amos

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EXAMINER

LANDAU, MATTHEW C

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 10/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/995,031

Applicant(s)

AMOS ET AL.

Examiner

Matthew Landau

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,5,7-11 and 13-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,7-11 and 13-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 4, 7-11, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Talwar et al. (US Pat. 6,300,208, hereinafter Talwar) in view of Huang et al. (US Pat. 6,248,673, hereinafter Huang).

Regarding claims 1, 2, 5, 7-11, and 14-16, Figure 2H of Talwar discloses a MOSFET comprising: a semi-conducting substrate 4 (n or p-type silicon) (col. 4, lines 39-41 and col. 5, lines 6-10) having source and drain regions (5 and 6); a gate dielectric layer 8 made of SiO<sub>2</sub> (col. 5, lines 14-16); and a gate 9 formed of Re (col. 5, lines 46-50) on top of said gate dielectric. A difference between Talwar and the claimed invention is the gate dielectric has a thickness of less than 50 angstroms. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Talwar by using a thickness within the claimed range, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The ordinary artisan would have been motivated to modify Talwar in the manner described above for the purpose of increasing the integration density (by forming smaller devices). A further difference between Talwar and the claimed invention is the gate has an

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interface trapped charge density of about  $3 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$  to about  $4 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$ . Huang discloses annealing a MOSFET in a hydrogen environment at a temperature of about  $350^\circ \text{C}$  at a pressure of about 700 torr (col. 8, lines 21-46 of Huang). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Talwar by using the hydrogen anneal process of Huang for the purpose of stabilizing interface states and trapped charges (col. 8, lines 54-57 of Huang). After performing the hydrogen anneal taught by Huang, it is inherent that the trapped charge density will be about  $3 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$  to about  $4 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$ .

Claims 1, 2, 4, 7-11, and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maria et al. (US PGPub 2001/0032995, hereinafter Maria) in view of Talwar and Huang.

Regarding claims 1, 2, 4, 8-11, 13, 15, and 16, Figure 4 of Maria discloses a MOSFET device comprising: a semi-conducting substrate 16 (silicon) having source and drain regions (12 and 14); a gate dielectric layer 20''' (20a/20b) (silicate of  $\text{La}_2\text{O}_3$ ) of less than 50 angstroms thickness (see page 3, paragraph [0033]) on said semi-conducting substrate 16; and a gate 22 formed of Pt (see page 3, paragraph [0034]) on top of said dielectric layer 20'''. The difference between Maria and the claimed invention is the gate electrode comprises Re. Figure 2H of Talwar discloses a MOSFET device comprising a gate electrode 9 made of Re or Pt (col. 5, lines 46-50). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Maria by using Re as the gate electrode for the purpose of selecting an equivalent material that is known in the art to be used for the same

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purpose (see MPEP 2144.06). A further difference between Maria and the claimed invention is the gate has an interface trapped charge density of about  $3 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$  to about  $4 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$ .<sup>1</sup> Huang discloses annealing a MOSFET in a hydrogen environment at a temperature of about  $350^\circ \text{C}$  at a pressure of about 700 torr (col. 8, lines 21-46 of Huang). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Maria by using the hydrogen anneal process of Huang for the purpose of stabilizing interface states and trapped charges (col. 8, lines 54-57 of Huang). After performing the hydrogen anneal taught by Huang, it is inherent that the trapped charge density will be about  $3 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$  to about  $4 \times 10^{10} \text{ cm}^{-2} \text{ eV}^{-1}$ .

Regarding claims 7 and 14, Figure 4 of Maria discloses the semi-conducting substrate 16 is n-type or p-type. It is inherent to have a doped substrate (n-type or p-type) in order to create a channel region below the gate.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1 and 10 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (571) 272-1731.

The examiner can normally be reached from 8:30 AM - 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on (571) 272-2298. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should any questions arise regarding access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Matthew C. Landau

October 15, 2006